Water Quality Implementation Plan for Lower Blackwater River, Maggodee Creek and Gills Creek (Fecal Coliform TMDLs)

Submitted to
The Stakeholders of
Lower Blackwater River, Maggodee Creek
and Gills Creek Watersheds

Prepared by:

Virginia Department of Conservation and Recreation
in cooperation with the Virginia Department of Environmental Quality

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Also Available for this project:
Water Quality Implementation Plan for Lower Blackwater River, Maggodee Creek, and Gills Creek (Fecal Coliform TMDL) Technical Report

1. Introduction

The Virginia Department of Environmental Quality (VADEQ) monitors waterways throughout the state to determine if waters meet water quality standards and support their designated uses. The United States EPA, through Section 303(d) of the Clean Water Act (CWA) and EPA's Water Quality Planning and Management Regulations, requires that states develop a Total Maximum Daily Load (TMDL) study for any water body that is found to be impaired, or exceeding a water quality standard. These TMDL studies identify the sources of impairment and reductions needed in those sources in order to bring the water body into compliance with water quality standards. Section 62.1-44.19:7 of Virginia's 1997 Water Quality, Monitoring, Information and Restoration Act (WQMIRA) requires the development of an implementation plan (IP) following the completion of a TMDL to "achieve fully supporting status for impaired waters". A TMDL Implementation Plan provides a detailed outline of suitable best management practices (BMPs) and a strategy that may be implemented in order to meet water quality standards. These BMP strategies are developed with input from local communities.

The Lower Blackwater River, Maggodee Creek and Gills Creek were initially placed on Virginia's 303(d) list of impaired waters in 1996 for violations of the fecal coliform (FC) bacteria water quality standard (Table 1, Figure 1). This violation indicates that the streams are not suitable for primary contact recreation (i.e., swimming). A water body is considered impaired if the fecal coliform standard is surpassed more than 10.5% of the time during an assessment period. TMDLs were completed for the Lower Blackwater River and Maggodee Creek in 2001 and for Gills Creek in 2002. These studies identified agricultural livestock direct deposition and runoff, human sanitary waste disposal and wildlife as significant sources of bacteria in these watersheds. The resulting bacteria loads from each source needed to meet water quality standards are identified as the TMDL allocations.

This summary is an abridged version of the full *Lower Blackwater River, Maggodee Creek and Gills Creek Water Quality Implementation Plan*. Both versions are available by contacting the Virginia Department of Conservation and Recreation (VADCR) or VADEQ. In fulfilling the state's requirement for the development of a TMDL Implementation Plan, a framework is established for reducing fecal coliform to levels that meet the water quality goals for which TMDL allocations were developed. Through the completion of the implementation plan and the establishment of an active implementation project, watershed stakeholders will be well on the way to restoring the impaired waters and enhancing the value of this important resource. Additionally, development of an approved plan improves chances for obtaining funding for implementation activities.

Table 1: Impaired watershed size, population, impairment length and rate of violation of the 1000 cfu/100ml fecal coliform water quality standard.

Watershed	Watershed Size (acres)	Population (2001)	Impairment Length (mi)	Violation Rate (%)
Lower Blackwater River	20,504	3,149	20	26
Maggodee Creek	29,187	3,546	21.1	49
Gills Creek	27,417	2,562	27.9	45

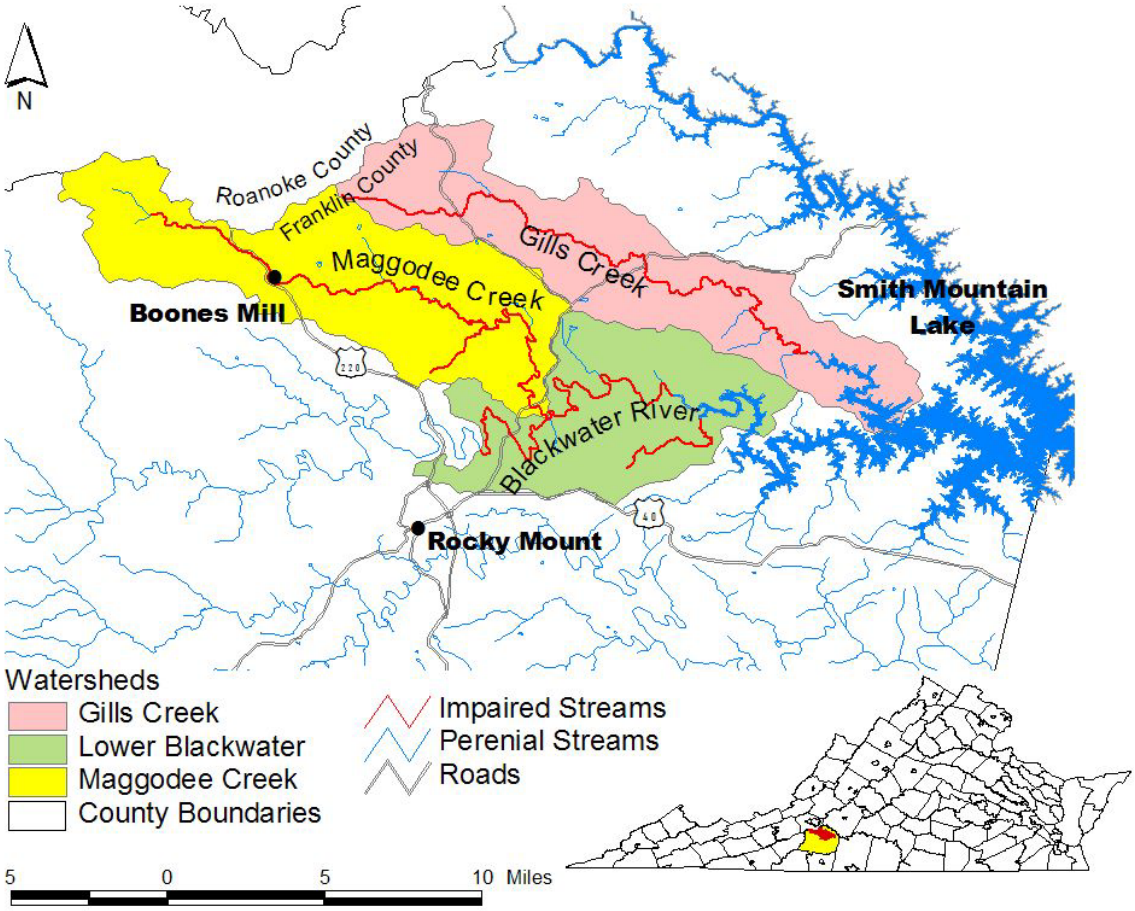

Figure 1: Watershed boundaries and impaired stream segments.

Fecal coliform bacteria are used as an indicator of the presence of microorganisms that cause illness in humans. Fecal coliform bacteria are found in the digestive systems of warm-blooded animals. The detrimental effects of bacteria in food and water supplies have been documented in areas throughout the United States and Canada. In May 2000 there were seven confirmed deaths with four other deaths under investigation, and over 2000 poisonings all attributed to drinking water polluted by *E. coli* Type 0157:H7 in the town of Walkerton, Ontario (Raine, 2000; Miller, 2000). The contamination resulted in a $250 million class action lawsuit filed against the Ontario government. The source of the pollution according to the Cattleman's Association was probably runoff from a feedlot located more than 5 miles from the wells used for the town's water supply. According to veterinarian Gerald Ollis, cattle are the "number one reservoir for this type of *E. coli* " and five to forty percent of cattle shed the bacteria at any given time. *E. coli* is a type of fecal coliform bacteria commonly found in intestines of humans and animals.

In Virginia, the Virginia Department of Health (VDH) was notified of campers and counselors at a Shenandoah Valley summer camp developing serious gastrointestinal illness in August 1994. *E. coli* 0157:H7 was confirmed as the causative agent. In Franklin

County Virginia, a 1997 outbreak of illnesses involving 3 children was attributed to E. *coli* (0157:H7) in Smith Mountain Lake. The children were exposed to the bacteria while swimming in the lake and a two year old almost died as a result of the exposure (Roanoke Times, 1997). In August of 1998, 7 children and 2 adults at a Day-care Center in rural Floyd County were infected with *E. coli* (0157:H7). Upon investigation, two of the properties' wells tested positive for total coliform (Roanoke Times, 1998). On June 6, 2000 Virginia's second largest water source, Crystal Spring in Roanoke, was shut down by Virginia Department of Health for *E. coli* contamination (Roanoke Times, 2000).

These are not isolated cases. Throughout the U.S., the Center for Disease Control estimates at least 73,000 cases of illnesses and 61 deaths per year caused by this one fecal coliform pathogen (i.e. *E. coli* 0157:H7 bacteria) (CDC, 1995 and 2001). Other fecal coliform pathogens (e.g. *E. coli* 0111) are responsible for similar illnesses. In addition, other bacterial and viral pathogens are indicated by the presence of fecal coliforms. During 2001 and 2002, the Centers for Disease Control and Prevention received reports of 30 outbreaks (defined as >2 people experiencing illness) of gastroenteritis related to recreational waters, many tied directly to fecal contamination (CDC, 2004). These 30 outbreaks account for more than 1,900 confirmed cases of illness. Whether the source of contamination is human or livestock, the threat of these pathogens appears more prevalent as both populations increase.

Health issues related to water quality are of particular concern in Franklin County because of the importance of recreational waters to the economy and lifestyle. As stakeholders, the community must assess the risk we are willing to accept and then implement measures to safeguard the public from these risks.

Key components of the implementation plan are discussed in the following sections:

- Review of the TMDL Development Study
- Process for Public Participation
- Assessment of Needs
- Implementation
- Cost / Benefit Analysis
- Stakeholder Responsibilities

2. Review of TMDL Studies

The Lower Blackwater River, Maggodee Creek and Gills Creek watersheds are located in Franklin County, Virginia. The total estimated 2005 population in these watersheds is 9,553. The Gills Creek watershed is comprised of forest (55%), agriculture (33%) and urban (10%) land uses (Table 2, Figure 2). Gills Creek is impaired for fecal coliform in a 27.9 mile segment extending to the confluence with the Blackwater River in Smith Mountain Lake. Maggodee Creek is impaired for fecal coliform along a 21.2 mile stretch extending to the confluence with the Blackwater River. The Maggodee Creek watershed is dominated by forest (62%), agriculture (33%) and urban (4.5%) land uses. The portion of the Blackwater River addressed in this plan (referred to as the Lower Blackwater River) is impaired for 20 miles from river mile 35.8, northwest of Rocky Mount, extending to the upper reaches of Smith Mountain Lake. The Lower Blackwater River watershed consists of forest (58%), agriculture (33%) and urban (8%) land uses. Water

from the Blackwater River and Gills Creek flows through Smith Mountain Lake, into the Roanoke River and eventually into the Albemarle Sound on North Carolina's coast.

Table 2: Land use distribution in the Lower Blackwater River, Maggodee Creek and Gills Creek watersheds. Good pasture (aka. improved pasture) is more intensively managed than poor pasture (aka. Unimproved pasture).

Land Use Category	**Acres**	**% of Total Area**
Cropland	15,609	20.2
Farmstead	238	0.3
Good Pasture	6,467	8.4
Poor Pasture	2,570	3.3
Livestock Access	357	0.5
Loafing Areas	236	0.3
Urban/Developed	5,736	7.4
Woodland	43,749	56.7
Water	2,143	2.8
Total	**77,108**	

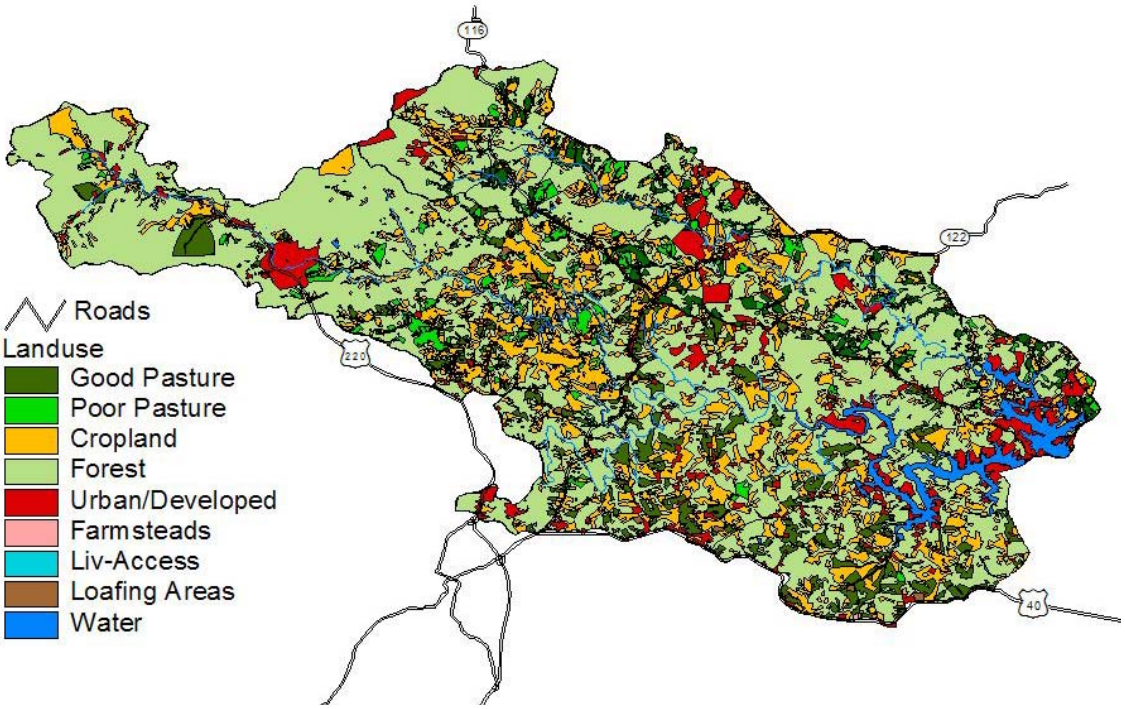

Figure 2: Distribution of land use categories in the Lower Blackwater River, Maggodee Creek and Gills Creek watersheds.

The Lower Blackwater River, Maggodee Creek and Gills Creek TMDLs were each developed separately by MapTech, Inc. The studies employed a water quality model (HSPF), landuse data, bacteria source information, hydrology and water quality monitoring data and local citizen and agency input to determine the sources of fecal coliform in the watersheds and the reductions necessary to bring the streams into compliance with water quality standards. The TMDLs were developed to result in 0%

violations of the fecal coliform water quality standard. The TMDLs recommend the following reductions in sources of bacteria to meet this goal:

	Straight Pipes (%)	Livestock Direct Deposition (%)*	Wildlife Direct Deposition (%)
Lower Blackwater River	100	89	0
Maggodee Creek	100	100	85
Gills Creek	100	100	95

*Direct deposition is the livestock waste that is deposited directly in the stream as a result of livestock access to the stream. A 100% reduction of livestock direct deposition means the eliminating the access of livestock to the stream, not the elimination of the actual livestock use on the land.

Implicit in the TMDLs is the requirement to keep all other bacteria sources at or below current levels. Although a reduction in wildlife direct deposition is required in each watershed to obtain 0% violations of the water quality standard, the studies showed that these streams can be removed from the impaired waters list by addressing human and livestock sources only. Currently, EPA guidance allows DEQ to remove a stream segment from the impaired waters list when the violation rate is 10.5% or less in an assessment period. Reductions of livestock direct deposition and the removal of straight pipes will result in violations below the 10.5% violation rate in the Lower Blackwater River and Maggodee Creek watersheds. An additional reduction of land-based sources of bacteria (i.e., runoff of waste from failing septic systems, agricultural runoff) is required to get the violation rate in Gills Creek below 10.5%.

If water quality goals are not achieved after addressing human and livestock sources, wildlife reductions may be addressed or a process could be initiated (*i.e.,* use attainability analysis) to change the designated use of the streams. The current designated use of the streams is full contact recreation, which includes swimming. Virginia allows the adoption of a secondary contact designated use in the case that the human and livestock sources are addressed to the maximum extent practicable and water quality goals are still not being met. The secondary contact designation indicates that the water body is not designated for swimming use or other activity that could result in the ingestion of water.

TMDLs and a TMDL IP were approved for fecal coliform impairments in the Upper portion of the Blackwater River Watershed in 2001. Additionally, an aquatic life TMDL was approved for the North Fork Blackwater River in 2003. An implementation project addressing sources of bacteria and sediment has continued in the Upper Blackwater River watersheds (North Fork Blackwater River, South Fork Blackwater River, Upper Blackwater River and Middle Blackwater River) under the direction of the Blue Ridge Soil and Water Conservation District since 2001.

3. Process for Public Participation

The actions and commitments described in this document are drawn together through input from citizens of the watersheds, Franklin County Government, VADCR, VADEQ, VDH, Virginia Cooperative Extension (VCE), Natural Resources Conservation Service (NRCS), Blue Ridge Soil and Water Conservation District (BRSWCD), Smith Mountain Lake Association (SMLA), Tri-County Lake Administrative Commission (TLAC), Farm Service Agency (FSA), National Park Service, Franklin County Cattleman's Association and Ferrum College. Every citizen and interested party in the watersheds is encouraged

to become involved in implementation of this IP and contribute what they are able to help restore the health of these streams.

Public participation in the IP development took place on three levels. First, a public meeting was held to inform the public about the end goals of the project and solicit participation in smaller, more targeted working group meetings. Second, three working groups were formed from communities of people with common interests and concerns regarding the implementation process. The agricultural, residential and government working groups provided an arena for direct citizen and local agency input in the development of the IP. Each group met twice between April and September 2005. Over 160 man-hours were devoted to participating in the working groups by individuals representing agricultural, residential and government interests. The third opportunity for public input was through the steering committee formed with representation from each working group, watershed citizens, VADCR, VADEQ, Franklin County Government, BRSWCD, NRCS, SMLA and Ferrum College. The steering committee met on November 7, 2005 with 15 members present. The purpose of the steering committee was to assimilate the recommendations of the working groups into the IP and guide the overall development of the final IP document.

4. Working Group Activities

Each working group discussed the type of best management practices (BMPs) needed to meet the water quality goals set forth in the TMDLs and how to promote those practices.

Agricultural Working Group

The agricultural working group consisted of beef and dairy producers throughout the watershed along with agency and agricultural organization representatives (24 members). The primary task of the Agricultural Working Group was to address bacteria sources attributed to agricultural operations, identify any obstacles to implementation of agricultural BMPs and recommend practical solutions to those obstacles. The group discussed the specifications of livestock exclusion and animal waste BMPs that are typically promoted in implementation areas. The main potential deterrents to producer participation in the implementation project were identified as the 35-foot stream buffer required for cost-share on livestock exclusion BMPs, the high cost of maintaining the type of exclusion fencing that meets specifications for cost-share and a lack of shade for livestock. The group recommended permanent, NRCS specification fencing as the best option, particularly in areas not adjacent to main stem streams. However, the group also recommended that temporary (polywire and PVC post) fencing should be promoted as an

option for producers on main stem streams that are likely to flood and damage fencing. Group members cited the low cost and ease of replacement as benefits of temporary style exclusion fencing. This type of temporary fencing is not currently eligible for cost-share. The group noted that while installation of exclusion fencing that meets NRCS specifications is currently a voluntary component of TMDL implementation, it may one day become mandatory. Group members agreed that waiting for regulations to force IP compliance is not the best action in light of the funding now available for BMPs.

The agricultural working group also recognized and recommended that the focus of agricultural educational and outreach activities related to implementation should be extended to beef producers. The perception exists that conservation activities in Franklin County have been geared towards dairy operations and that an effort needs to be made to involve beef operations. Suggested educational and outreach tools include personal contacts, farm visits, dinners and speakers at local agricultural organization meetings, field walks and articles in local papers. The agricultural working group also provided input to VADCR on the quantity and location of BMPs needed to meet water quality goals as well as the technical assistance/staffing needed to administer the successful implementation project.

Residential Working Group

The primary tasks of the Residential Working Group were to (1) find ways to identify and eliminate straight pipes (pipes directly discharging wastewater into a water body without adequate treatment) and failing septic systems, (2) address difficulties faced by landowners in correcting these problems, (3) evaluate technical assistance/staffing needed to administer the program and (4) recommend educational and outreach tools that will help promote the implementation of residential BMPs. The group consists of 17 citizens and agency representatives. The group recommended that implementation efforts include a septic tank pump out program in the Gills Creek watershed in order to identify failing systems and promote septic system maintenance. This practice would be offered only in the Gills Creek watershed because the TMDL showed a reduction in land-based sources of bacteria is needed to bring the stream below the 10.5% violation rate in this watershed only. Franklin County is considering implementing a mandatory septic tank pump out program for areas within 500 ft of the elevation of Smith Mountain Lake (795 ft). The group also recommended offering the replacement and repair of malfunctioning septic systems as part of the implementation program. The implementation project will focus on addressing all failing septic systems in the Gills Creek watershed and failing septic systems within 300 ft of a stream in the Lower Blackwater River and Maggodee Creek watersheds.

Canoe floats were recommended as a practical method to identify straight pipes along some main stem areas, but the group felt that the majority of issues will be found along smaller tributaries. The suggestion was made to focus outreach on clusters of homes along the smaller tributaries. Possible outreach methods discussed include mailings and fliers focusing on the financial incentives available and the liability associated with environmental health risks of human waste, educational materials outlining the components and proper maintenance of septic systems, and a video highlighting proper septic system maintenance to be distributed to local agencies and organizations. The group also discussed water quality concerns in these streams related to excess sediment

and debris. The group also provided VADCR feedback on the quantity and cost of BMPs required to meet water quality goals.

Government Working Group

The two main goals of the Government Working Group were to (1) identify technical and financial resources presently available that could support implementation and (2) identify regulatory controls that relate to the IP's water quality goals. The group consists of 22 representatives from a variety of local, state and federal agencies. The group discussed and recommended the roles of following agencies and organizations in the implementation project:

- The BRSWCD will provide technical and financial assistance to farmers and homeowners through the Virginia Agricultural BMP Cost-Share and Tax Credit programs.
- VADCR will support BRSWCD through overall management of the agricultural and residential implementation programs.
- The NRCS will provide BMP design support to BRSWCD along with providing financial and technical services to farmers through existing programs such as the Conservations Reserve Enhancement Program (CREP) and the Environmental Quality Incentives Program (EQIP).
- The VDH will refer citizens with waste treatment issues to BRSWCD and will write permits for residential BMPs.
- VCE will assist in the development of educational and outreach activities.
- VADEQ will maintain the water quality monitoring schedule as described in this document.
- Ferrum College and SMLA will provide additional water quality data through their existing *Smith Mountain Lake Water Quality Monitoring Program*.
- Franklin County is a partner in this project and will coordinate with VADCR and BRSWCD on issues related to the implementation project (i.e., proposed septic tank pump out regulations).

Regulatory controls identified by the Government Working Group as relating to implementation include Virginia Sewage Handling and Disposal Regulations, the Virginia Agricultural Stewardship Act, and efforts by Franklin County to address sanitary waste disposal issues through mass drain fields and the potential septic tank pump out program.

5. Assessment of Needs

The quantity and type of BMPs required during implementation were determined through spatial analyses of land use, stream-network data, U.S. Census data, Franklin County GIS data, the USDA Common Land Unit Layer (CLU) and data archived in the VADCR Agricultural BMP Database and TMDL development documents. The map layers and archived data were combined to establish estimates of bacteria sources and corrective actions required overall and in each watershed (Table 3). Additionally, input from local agency representatives and the working groups was used to modify the analyses.

The IP focuses on excluding livestock from perennial streams because the TMDLs identified low flow (dry) conditions as critical periods of fecal coliform violations.

Estimates of livestock exclusion fencing needs were based on a 100% reduction of livestock direct deposition in the Gills Creek and Maggodee Creek watersheds and an 89% reduction of livestock direct deposition in the Lower Blackwater River watershed as identified in the TMDLs. The method used to estimate necessary reductions assumes that exclusion fencing is needed on pastureland and loafing areas that border a perennial stream. In the case that a perennial stream is bordered on both sides by pasture, it is assumed that fencing is needed on both sides. In these cases, a hardened crossing is estimated for every 1,500 feet of pastureland that is intersected by a stream.

There are approximately 97 miles of perennial stream and 233 miles of intermittent stream in the three watersheds. After accounting for the 2,600 feet of known existing streamside fencing on perennial streams, the total length of livestock exclusion fencing required for perennial streams is approximately 28 miles (Table 3, Figure 3). Based on data archived in the DCR Agricultural Database and the TMDL Implementation Tracking Program, associated with the streamside fencing will be 63 grazing land protection systems (SL-6), 14 stream protection systems (WP-2T) and 3 loafing lot management systems (WP-4B). The estimate of loafing lot management systems is based on discussions with BRSWCD. Currently there are 12 dairies operating in these watersheds and BRSWCD estimates that 3 of the dairies may need a loafing lot management system. In addition, it was estimated that 7.5% of installed fencing would need to be replaced during the implementation project as a result of flooding and other damage. Funding for fencing replacement is included in the WP-2T practice, with an average cost of $3 per foot of fencing replaced.

Table 3: Estimates of stream exclusion fencing needs, number of straight pipes and number of failing septic systems for each watershed.

Implementation Need	Lower Blackwater River	Maggodee Creek	Gills Creek	Total
Stream exclusion fencing (feet)	39,103	45,148	64, 112	148,363
Straight Pipes	8	10	8	26
Failing Septic Systems	8	38	20	66

The grazing land protection system (SL-6) includes streamside fencing with a 35-foot stream buffer, cross-fencing for pasture management, hardened crossings and a livestock watering system. An additional state tax credit of 25% of the operator's contribution is available. The stream protection practice (WP-2T) provides cost-share for stream exclusion fencing and hardened access areas along with a $0.50 per linear foot of fencing

maintenance payment to account for damaged and destroyed fencing. The loafing lot management system (WP-4B) provides cost-share and state tax credit for development of loafing paddocks, hardened walkways and stream exclusion fencing in areas of heavy livestock use. Other agricultural BMPs that will be available during implementation through Virginia Agricultural BMP Cost-Share include woodland buffer filter area (FR-1), stream crossing and hardened access (WP-2B), stream bank stabilization in conjunction with WP-2T (WP-2A) and animal waste control facility (WP-4).

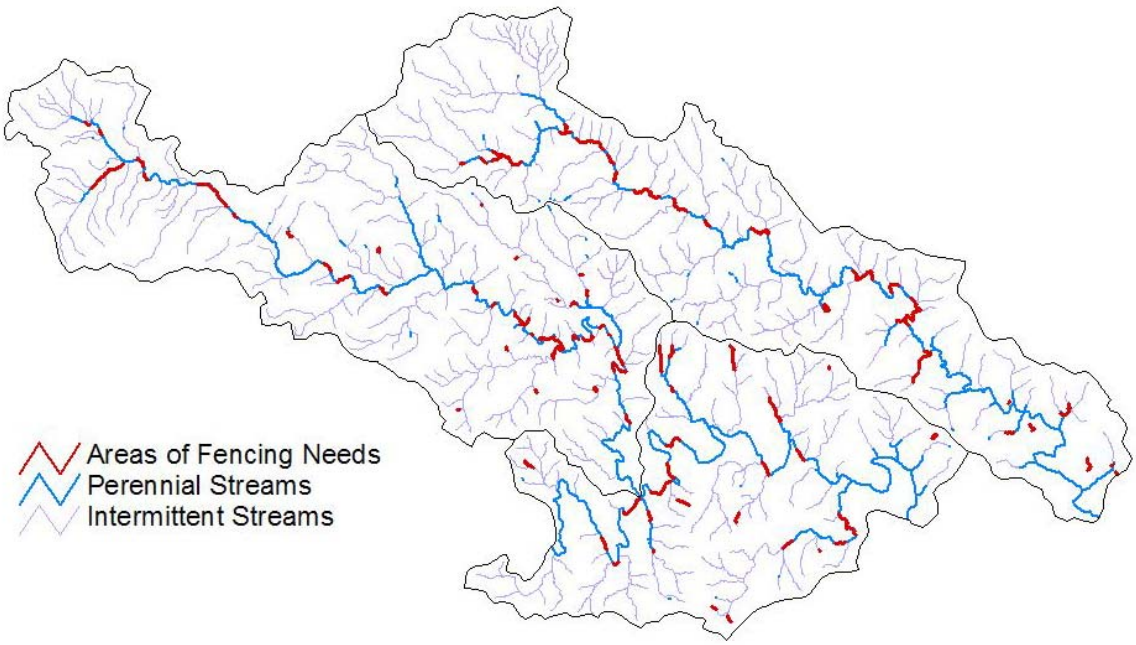

Figure 3: Areas of estimated livestock exclusion fencing needs.

Residential implementation needs focus on addressing straight pipes and failing septic systems. The number and location of failing septic systems were based on analysis of U.S. Census data, stream network data and information from VDH. The total number of septic systems was estimated from 1990 census block data and projected to 2005 using population growth rates for Franklin County reported in the 2000 census. The number of failing septic systems was estimated using a failure rate of 1.3% as determined from septic repair permits administered by VDH. The failing septic systems were then distributed among the subwatersheds based on the number of homes over 20 years old. The number of straight pipes was estimated as 0.5% of the total number of septic systems in each watershed. The straight pipes were then distributed throughout the watersheds based on the number of homes in each subwatershed over 30 years old.

VADCR and the Residential Working Group decided to budget residential implementation based on replacing all straight pipes with either a conventional septic system or an alternative waste treatment system. Costs in the Gills Creek watershed also include replacing all failing septic systems because a reduction in land-based sources of bacteria is required to remove the stream from the impaired waters list. The cost estimate for the Lower Blackwater River and Maggodee Creek reflects replacing only failing septic septic systems within 300 ft of a stream (6 and 8 systems, respectively) in an effort

to address systems that have the greatest potential to impact water quality. Alternative waste treatment systems are used where soils or groundwater conditions are not suitable for a conventional system. Based on data from the Upper Blackwater Implementation Project, input from the residential working group and consultation with VDH, it was assumed that 10% of new systems would need to be alternative waste treatment systems. Based on typical costs in the region, a conventional septic system is estimated at $5,000 and an alternative waste treatment system is estimated at $20,000.

The Residential Working Group decided to pursue a septic tank pump-out program in the Gills Creek watershed because of the required reduction in land-based sources of bacteria. Based on census data and discussion with the Residential Working Group, an estimate of 100 pump-outs was used for the estimated cost. Based on a survey of septic contractors, an average of $225 for a septic tank pumpout was used for cost estimates. In addition to the BMPs listed in Table 4, septic system repairs (RB-4) and septic connection to public sewer (RB-2) will be promoted through cost-share. There is a limited area in Boones Mill and northwest of Rocky Mount where connection to public sewer is feasible. Based on input from the residential working group, few sites are anticipated to be suitable for the RB-2 practice.

The number of full time equivalents (FTE) necessary for agricultural technical assistance during implementation was determined through analysis of historical cost-share data from BRSWCD and discussions with the BRSWCD and the Agricultural Working Group. As a result, an estimated 2 FTE are needed to provide agricultural technical assistance through 5 years of implementation representing a total of 10 man-years. The BRSWCD suggested that one agricultural staff member be hired to begin with the possibility of hiring another if the need arises.The number of FTE required for residential implementation was based on historical data from other VADCR TMDL implementation projects and discussion with BRSWCD. It is estimated that 1 FTE, or 5 man-years will be needed to provide residential technical assistance over the 5-year implementation timeline. It was assumed that the individuals responsible for implementation will handle all administrative duties related to the project. Estimates of BMPs and technical assistance needed for full implementation in the watersheds are listed in Table 4.

Table 4: Estimation of necessary control measures and unit costs for agricultural and residential implementation programs.

Control Measure	Unit	Estimated Units Needed	Average Cost / Unit ($)
Agricultural Program:			
Full Exclusion System (SL-6)	system	63	$16,700
Stream Protection Practice (WP-2T)	system	14	$7,857
Loafing Lot Management System (WP-4B)	system	3	$27,500
Exclusion fence replacement	feet	11,000	$3.00
Technical Assistance	man-year	10	$50,000
Residential Program:			
Conventional Septic System installation/replacement (RB-4)	system	53	$5,000
Alternative Waste Treatment System (RB-5)	system	7	$20,000
Septic System pump-out (RB-1)	system	100	$225
Technical Assistance	man-year	5	$50,000

6. Implementation

In general, Virginia favors a staged implementation approach. Staged implementation is an iterative process that addresses sources that have a large impact on water quality first. In the case of these streams, this approach focuses on the exclusion of livestock from streams and the replacement of straight pipes with suitable treatment systems. Implementation is scheduled to begin in February 2006 after which five milestones need to be met over the next five years. The HSPF water quality model developed during the TMDL study was used to determine the anticipated response in water quality to the implementation of BMPs. Water quality response is measured by the expected rate of violation of the geometric mean fecal coliform water quality standard. The first milestone of installation of 20% of both agricultural and residential BMPs will be one year after implementation begins (Table 5). The expected water quality response is a 4-35% reduction in violation rates. The milestone at the end of the fifth year is 100% implementation of agricultural and residential control measures resulting in 8.32%, 0.21% and 14.9% exceedance of the water quality standard in Maggodee Creek, Lower Blackwater River and Gills Creek, respectively. Compliance with the fecal coliform standard is anticipated within 5 years of full implementation, allowing for lag time in BMP effectiveness and stabilization of bacteria populations in streams. If water quality improves to the level that one or more of the streams can be removed from the impaired waters list prior to the five-year milestone, the steering committee will evaluate the cost-share requests and monitoring data to determine whether the project timeline should be revised.

Two violation rates are included for each milestone for the Lower Blackwater River in Table 5. The Lower Blackwater River TMDL was developed assuming that the contributing waters from the North Fork Blackwater River, South Fork Blackwater River,

Upper Blackwater River and Middle Blackwater River are meeting the fecal coliform water quality standard. These four streams are on the impaired waters list and are currently under the Upper Blackwater Implementation Project to address fecal coliform impairments. At this time it is not realistic to assume that water quality standards are being met in these four watersheds, however, implementation measures are resulting in some water quality improvements (DEQ, 2005). The first violation rate presented in each row for the Lower Blackwater River is the rate assuming the four contributing streams are meeting water quality standards. The violation rate in parentheses assumes that fecal coliform concentrations in each of the four contributing watersheds are at levels existing prior to the beginning of implementation activities (2001). The anticipated violation rate will be between these two rates depending on the continued progress of the implementation efforts in the upstream segments.

Potential funding sources available for implementation were identified during plan development. It is anticipated that funding for agricultural BMPs will be provided through a combination of EPA 319 funds, Virginia Agricultural BMP Program and federal sources including the NRCS CREP program. Residential practices will most likely be funded through EPA 319 funds and grant funds that may be applied for during implementation. Detailed descriptions of each source are included in the technical document and can also be obtained from the BRSWCD, VADCR, NRCS, VACES, and VADEQ. Sources include:

- EPA 319 Grant Incremental Funds
- Virginia Agricultural Best Management Practices Cost-Share Program
- Virginia Agricultural Best Management Practices Tax Credit Program
- Virginia Agricultural Best Management Practices Loan Program
- Virginia Water Quality Improvement Fund
- Conservation Reserve Program (CRP)
- Conservation Reserve Enhancement Program (CREP)
- Environmental Quality Incentives Program (EQIP)
- Wildlife Habitat Incentive Program (WHIP)
- Wetland Reserve Program (WRP)
- Southeast Rural Community Assistance Project (Southeast RCAP)

Progress toward water quality goals will be assessed during implementation through the tracking of BMP installations by VADCR and continued water quality monitoring by VADEQ, SMLA and Ferrum College. VADCR will evaluate implementation progress and monitoring data periodically with consultation with the steering committee throughout the implementation with a comprehensive evaluation at the end of the proposed five-year implementation period. A more detailed explanation of the monitoring network planned for the implementation period is included in the Section 8 of this report.

		Implementation Progress		Anticipated Water Quality Response: % FC geometric mean water quality exceedence		
Milestone	**Date**	**Agricultural BMPs**	**Residential BMPs**	**Maggodee Creek**	**Lower Blackwater River**	**Gills Creek**
Existing	2/1/2006	Current Conditions		89.8	24.1 (62.4)	53.2
1	2/1/2007	20%	20%	86.2	15.6 (61.1)	47.9
2	2/1/2008	40%	40%	79.8	7.67 (58.2)	41.0
3	2/1/2009	60%	60%	69.2	2.51 (49.9)	34.1
4	2/1/2010	80%	80%	49.2	0.58 (46.0)	22.6
5	2/1/2011	100%	100%	8.32	0.21 (38.7)	14.9
De-listing	2/1/2016	Taken off 303(d) impaired waters list		0	0	0

Table 5: Implementation milestones and water quality response for the Maggodee Creek, Lower Blackwater River and Gills Creek watersheds.

Implicit in the process of a staged implementation is the targeting of control measures. Targeting is the focusing of BMPs in subwatersheds where the greatest improvement in water quality in relation to implementation effort is expected. Targeting of critical areas for BMP installation was accomplished through analysis of land use and bacteria source data, CLU data, stream network GIS layers and monitoring results. In order to determine the priority areas for livestock exclusion BMPs, the subwatersheds for each impairment were ranked based on the amount of livestock bacteria removed per length of exclusion fencing needed (Table 6, Figure 4). Bacterial source tracking (BST) revealed a relatively uniform distribution of human bacteria throughout the sites sampled. Because this monitoring data did not identify any hotspots, subwatersheds were ranked for residential implementation by the contribution of bacteria from straight pipes in each subwatershed (Table 6). An effort should be made to focus implementation efforts in subwatersheds based on the order illustrated in Table 6.

Table 6: Subwatersheds ranked in descending order of agricultural and residential implementation priority for each of the 3 impaired watersheds. The location of the subwatersheds is illustrated in figure 4.

Impaired watershed	Subwatersheds listed in order of implementation priority
Maggodee Creek: agricultural	9, 10, 7, 8, 6, 1, 5, 4, 3, 2
Magoddee Creek: residential	5, 6, 4, 7, 9, 1, 2, 10, 3, 8
Lower Blackwater: agricultural	16, 17, 12, 14, 13, 15, 11
Lower Blackwater: residential	13, 11, 16, 12, 14, 17, 15
Gills Creek: agricultural	4g, 6g, 3g, 5g, 1g, 9g, 2g, 7g, 8g
Gills Creek: residential	5g, 1g, 3g, 6g, 4g, 9g, 8g, 2g, 7g

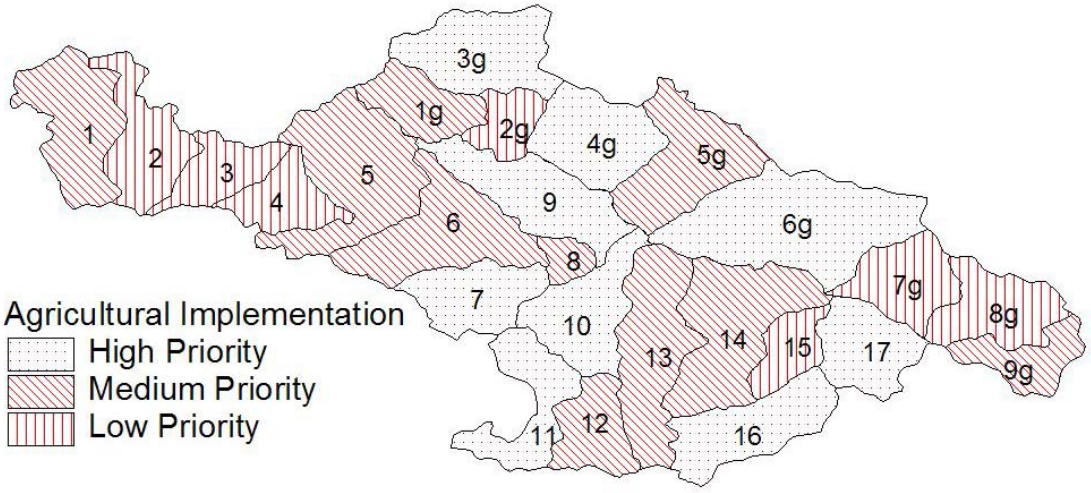

Figure 4: Agricultural implementation priorities for the Maggodee Creek, Lower Blackwater River and Gills Creek subwatersheds. The subwatershed labels correspond with the labels included in Table 6.

7. Cost / Benefit Analysis

Agricultural and residential BMPs and the associated technical assistance necessary to obtain water quality goals were quantified as described in the *Assessment of Needs* section. Data archived in the DCR Agricultural Database and the DCR TMDL Implementation Tracking Program were used to estimate average costs for agricultural and residential BMPs. DCR estimated the associated cost for systems needed for full livestock exclusion and land-applied BMPs by multiplying the unit cost by the estimated units needed for each subwatershed. The total estimated cost to install control measures that will ensure full livestock exclusion and reduce land-based sources of bacteria in all three watersheds is $1,277,600 (Table 7). It was determined in previous TMDL implementation planning efforts and through consultation with BRSWCD that it would require $50,000 to support the salary, benefits, travel, and training of one technical man-year. The anticipated cost of 10 man-years (2 FTE/year) for agricultural implementation is $500,000 bringing the total cost of agricultural technical assistance and BMP installation to $1,777,600. The BRSWCD suggested that one agricultural staff member be hired to begin with the possibility of hiring another if the need arises.

As mentioned in the *Assessment of Needs* section, residential implementation cost estimates are based on replacing all straight pipes in the 3 watersheds with either a conventional septic system or an alternative waste treatment system, replacing all falling septic systems in the Gills Creek watershed, addressing failing septic systems within 300 ft of a stream in the Lower Blackwater River and Maggodee Creek watersheds and 100 septic tank pump outs in the Gills Creek watershed. Based on typical costs in the region, a conventional septic system is estimated at $5,000, an alternative waste treatment system is estimated at $20,000, and a septic tank pump out is $225. The total cost for the estimated 5 man-years of residential technical assistance is $250,000. The total cost estimated for residential BMPs and residential technical assistance is $677,500.

Table 7: Estimated annual and total cost for full implementation in the Maggodee Creek, Lower Blackwater River and Gills Creek watersheds.

Year	Agricultural BMPs ($)	Agricultural Technical Assistance ($)	Residential BMPs ($)	Residential Technical Assistance ($)	Cost Per Year ($)
1	248,920	100,000	85,500	50,000	478,920
2	248,920	100,000	85,500	50,000	478,920
3	248,920	100,000	85,500	50,000	478,920
4	248,920	100,000	85,500	50,000	478,920
5	248,920	100,000	85,500	50,000	478,920
6-10	33,000	0	0	0	33,000
Total	**$1,277,600**	**$500,000**	**$427,500**	**$250,000**	**$2,455,100**

The primary benefit of implementation is cleaner waters in Virginia. Specifically, fecal contamination and sediment concentrations in Lower Blackwater River, Maggodee Creek, and Gills Creek will be reduced to meet water quality standards and maintain high quality water for downstream uses. It is hard to gage the impact that reducing fecal contamination will have on public health, as most cases of waterborne infection are not reported or are falsely attributed to other sources. However, because of the reductions required, the incidence of infection from fecal sources through contact with surface waters should be reduced considerably. Additionally, because of stream-bank protection that will be provided through exclusion of livestock from streams, and restoration of the riparian area through implementation of the Conservation Reserve Enhancement Program (CREP) in some areas, the aquatic habitat will be improved in these waters. The vegetated buffers that are established will also serve to reduce sediment and nutrient transport to the stream from upslope locations. In areas where pasture management is improved through implementation of grazing land protection BMPs, soil and nutrient losses should be reduced. Additionally infiltration of precipitation should be increased, decreasing peak flows downstream. These benefits are particularly important in light of local concerns regarding bacteria, sediment and debris in streams and the impact on Smith Mountain Lake.

An important objective of the implementation plan is to foster continued economic vitality and strength. This objective is based on the recognition that healthy waters improve economic opportunities for Virginians and a healthy economic base provides the resources and funding necessary to pursue restoration and enhancement activities. The impaired waters addressed in this report all drain to Smith Mountain Lake, which is a vital economic resource for Franklin County and surrounding communities. The agricultural and residential practices recommended in this document will provide economic benefits to the landowner, as well as, the expected environmental benefits onsite and downstream. Specifically, alternative (clean) water sources, exclusion of cattle from streams, intensive pasture management, and private sewage system maintenance or upgrades will each provide economic benefits.

A clean water source has been shown to improve weight gain and milk production in cattle. Fresh clean water is essential for livestock with healthy cattle consuming, on a daily basis, close to 10% of their body weight during winter and 15% of their body weight in summer. Many livestock illnesses can be spread through contaminated water supplies. For instance, coccidia can be delivered through feed, water and haircoat contamination with manure (VACES, 2000). In addition, horses drinking from marshy areas or areas where wildlife or cattle carrying Leptospirosis have access tend to have an increased incidence of moonblindness associated with Leptospirosis infections (VACES, 1998). A clean water source can prevent illnesses that reduce production and incur the

added expense of avoidable veterinary bills. In addition to reducing the likelihood of animals contracting waterborne illnesses by providing a clean water supply, streamside fencing excludes livestock from wet, swampy environments often found next to streams where cattle have regular access. Keeping cattle in clean dry areas has been shown to reduce the occurrence of mastitis and foot rot. The VACES (1998) reports that mastitis currently costs producers $100 per cow in reduced quantity and quality of milk produced. On a larger scale, mastitis costs the U.S. dairy industry about $1.7-2 billion annually or 11% of total U.S. milk production. While the spread of mastitis through a dairy herd can be reduced through proper sanitation of milking equipment, mastitis-causing bacteria can be harbored and spread in environments where cattle have access to wet and dirty areas. Implementation of streamside fencing and well managed loafing areas will reduce the amount of time that cattle have access to these areas.

Taking the opportunity to implement an improved pasture management system in conjunction with installing clean water supplies will also provide economic benefits for the producer. Improved pasture management can allow a producer to feed less hay in winter months, increase livestock stocking rates by 30 - 40%, and consequently, improve the profitability of the operation. With feed costs typically responsible for 70-80% of the cost of growing or maintaining an animal, and pastures providing feed at a cost of .01-.02 cents/lb of total digestible nutrients (TDN) compared to .04-.06 cents/lb TDN for hay, increasing the amount of time that cattle are fed on pasture is clearly a financial benefit to producers (VACES, 1996). Standing forage utilized directly by the grazing animal is always less costly and of higher quality than the same forage harvested with equipment and fed to the animal. In addition to reducing costs to producers, intensive pasture management can boost profits, by allowing higher stocking rates and increasing the amount of gain per acre. A side benefit is that cattle are more closely confined allowing for quicker checking and handling.

The residential programs will play an important role in improving water quality, since human waste can carry with it human viruses in addition to the bacterial and protozoan pathogens that all fecal matter can potentially carry with it. In terms of economic benefits to homeowners, an improved understanding of private sewage systems, including knowledge of what steps can be taken to keep them functioning properly and the

need for regular maintenance, will give homeowners the tools needed for extending the life of their systems and reducing the overall cost of ownership. The average septic system will last 20-25 years or longer if properly maintained. Proper maintenance includes; knowing the location of the system components and protecting them by not driving or parking on top of them, and not planting trees where roots could damage the system, keeping hazardous chemicals (including water softening chemicals) out of the system, and pumping out the septic tank every 3 to 5 years. The cost of proper maintenance is relatively inexpensive in comparison to repairing or replacing an entire system. Additionally, improvements to private waste treatment systems can enhance property values in the watershed.

8. Water Quality Monitoring

Virginia's 1997 Water Quality Monitoring, Information and Restoration Act requires that TMDL implementation plans include measurable goals and milestones for attaining water quality standards. Implicit in those milestones is the requirement of a method to measure progress. Implementation progress will be evaluated through water quality monitoring conducted by VADEQ and citizen monitoring support maintained by SMLA and Ferrum College. VADEQ will monitor 9 locations in the three watersheds (Figure 5). The ambient watershed and ambient trend stations will be sampled bi-monthly from July 2006 to July 2012. The reservoir stations will be sampled monthly from April to October for the same time period (Table 8). The following parameters will be collected at all stations: *E.coli* bacteria, temperature, dissolved oxygen, specific conductance, turbidity, total nitrogen, total phosphorus, total solids, and total suspended solids. At the time of the development of these three TMDLs, fecal coliform was the indicator species for Virginia's bacteria water quality standard. In 2003, Virginia began the transition to an *E. coli* water quality standard. *E. coli* is a subset of fecal bacteria that has been shown to have a stronger correlation to gastrointestinal illness than fecal coliform. Assessment of implementation progress will rely on results of the *E. coli* sampling.

SMLA and Ferrum College administer a water quality monitoring program on Smith Mountain Lake and its tributaries. Four tributary monitoring stations are located in the three subject watersheds. These sites are monitored every other week during the summer for total phosphorus, chlorophyll-a and water clarity. In addition, biological source tracking (BST) samples are taken from each tributary site twice each summer. The BST will document changes in contributions of bacteria from different sources during implementation.

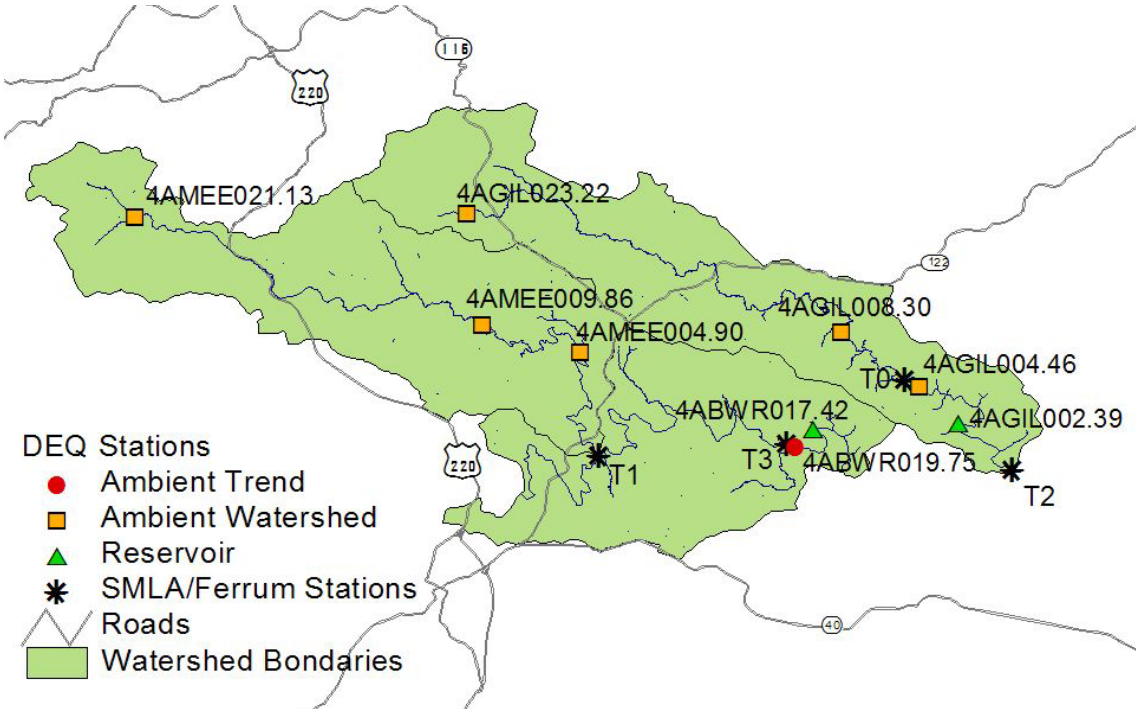

Figure 5: Location of DEQ and SMLA/Ferrum College Monitoring Stations.

Table 8: DEQ and SMLA/Ferrum College monitoring station in the Maggodee Creek, Lower Blackwater River and Gills Creek watersheds

DEQ Station ID	Station Location	Stream Name	Station Type
4ABWR017.42	Buoy No. 50 - Station 9	Blackwater R. - SML	Reservoir Station
4ABWR019.75	Rt. 834 Bridge - Brooks Mill Bridge	Blackwater R.	Ambient Trend
4AGIL002.39	Below Strippers Landing - Sta. 11	Gills Cr. - SML	Reservoir Station
4AGIL004.46	Rt. 668 Bridge	Gills Cr.	Ambient Watershed
4AGIL008.30	Rt. 834 Bridge near BTW Monument	Gills Cr.	Ambient Watershed
4AGIL023.22	Rt. 657 Bridge near headwaters	Gills Cr.	Ambient Watershed
4AMEE004.90	Rt. 697 Bridge	Maggodee Creek	Ambient Watershed
4AMEE009.86	Rt. 635 Bridge, Franklin Co.	Maggodee Creek	Ambient Watershed
4AMEE021.13	Rt. 613 Bridge Below Conflu./w Fork	Maggodee Creek	Ambient Watershed
SMLA/Ferrum Station ID	**Station Location**	**Stream Name**	**Station Type**
T0	Several miles upstream of SML	Gills Creek	Citizen
T1	Above confluence with Blackwater R.	Maggodee Creek	Citizen
T2	Above confluence with SML	Gills Creek	Citizen
T3	Rte. 834 Bridge	Blackwater R.	Citizen

9. Education and Outreach

The BRSWCD will take on the responsibility of initiating contact with agricultural producers and homeowners to encourage the installation of agricultural and residential BMPs and to notify landowners that cost-share assistance is available. The goal of this effort is to communicate the existing water quality problems to citizens and promote the corrective actions needed to address these problems. This is a role that BRSWCD currently holds for the Upper Blackwater River Implementation Project. Specific outreach activities recommended by the working groups include information exchange through agricultural and environmental newsletters, presentations to local agricultural organizations (i.e., Farm Bureau, Cattlemans' Association), field days, articles submitted to local publications and mailings distributed to target audiences throughout the watersheds.

10. Stakeholder's Roles and Responsibilities

Achieving the goals of this effort (i.e., improving water quality and removing these waters from the impaired waters list) relies on stakeholder participation. The local stakeholders charged with implementation of control measures and the stakeholders charged with overseeing our nation's human health and environmental programs must first acknowledge there is a water quality problem and then make changes in our operations, programs, and legislation to address these pollutants. The roles of stakeholder groups are discussed here and in Section 4 of this report.

The BRSWCD will provide technical and financial assistance to farmers and homeowners through the Virginia Agricultural BMP Cost-Share and Tax Credit programs. Their responsibilities will include promoting implementation goals, available funding and the benefits of BMPs and providing assistance in the survey, design, layout, and approval of agricultural and residential BMPs. NRCS will provide BMP design support to BRSWCD along with providing financial and technical services to farmers through existing programs such as the Conservations Reserve Enhancement Program (CREP) and the Environmental Quality Incentives Program (EQIP).

The USEPA has the responsibility of overseeing the various programs necessary for the success of the Clean Water Act (CWA). However, administration and enforcement of such programs falls largely to the states. In the Commonwealth of Virginia, water quality problems are dealt with through legislation, incentive programs, education, and legal actions. Currently, there are four state agencies responsible for regulating activities that impact water quality in Virginia. These agencies include: Virginia Department of Environmental Quality, Virginia Department of Conservation and Recreation, Virginia Department of Agriculture and Consumer Services, and Virginia Department of Health.

VADEQ has responsibility for monitoring the waters to determine compliance with state standards, and for requiring permitted, point source dischargers to maintain loads within permit limits. They have the regulatory authority to levy fines and take legal action against those in violation of permits. Beginning in 1994, animal waste from confined animal facilities in excess of 300 animal units (cattle and hogs) has been managed through a Virginia general pollution abatement permit. These operations are required to implement a number of practices to prevent groundwater contamination. In response to increasing demand from the public to develop new regulations dealing with animal waste,

in 1999, the Virginia General Assembly passed legislation requiring VADEQ to develop regulations for the management of poultry waste in operations having more than 200 animal units of poultry (about 20,000 chickens), (ELI, 1999).

VADCR holds the responsibility for addressing nonpoint sources (NPS) of pollution including nutrient management, erosion and sediment control, stormwater, and agricultural BMPs. Most VADCR programs dealing with agricultural NPS pollution historically have been through education and voluntary incentive programs. These cost-share programs were originally developed to meet the needs of voluntary partial participation and not the high rates of stakeholder participation required by many TMDLs. To meet the needs of the TMDL program and achieve the goals set forth in the CWA, the incentive programs must be reevaluated to account for increased participation. It should be noted that VADCR does not have regulatory authority over the majority of issues addressed here.

Through Virginia's Agricultural Stewardship Act, VDACS and the Commissioner of Agriculture has the authority to investigate claims that an agricultural producer is causing a water quality problem on a case-by-case basis (Pugh, 2001). If deemed a problem, the Commissioner can order the producer to submit an agricultural stewardship plan to the local soil and water conservation district. If a producer fails to implement the plan, corrective action can be taken which can include a civil penalty up to $5,000 per day. The Commissioner of Agriculture can issue an emergency corrective action if runoff is likely to endanger public health, animals, fish and aquatic life, public water supply, etc. An emergency order can shut down all or part of an agricultural activity and require specific stewardship measures. VDACS has only 1 staff member dedicated to enforcing the Agricultural Stewardship Act, and very little funding is available to support water quality sampling. The Agricultural Stewardship Act is entirely complaint driven. As of March of 2003, 215 complaints, of which 41% were founded, had been received statewide since the initiation of the legislation (VDACS 2003).

VDH is responsible for maintaining safe drinking water measured by standards set by the USEPA. Their duties also include septic system regulation and regulation of biosolids land application according to the *Virginia Sewage Handling and Disposal Regulations*. Like VDACS, VDH is complaint driven. Complaints can range from a vent pipe odor that is not an actual sewage violation and takes very little time to investigate, to a large discharge violation that may take many weeks or longer to effect compliance. In the scheme of these TMDLs, VDH has the responsibility of enforcing actions to correct or eliminate failed septic systems and straight pipes.

State government has the authority to establish state laws that control delivery of pollutants to local waters. Local governments in conjunction with the state can develop ordinances involving pollution prevention measures. One example of this authority a recent addition to the Virginia Code which allows localities to prohibit feeding of waterfowl that are found to exist in populations that threat public health or the environment (§ 29.1-527.1). Another example is the proposed septic tank pump-out program for dwellings in the Smith Mountain Lake vicinity. In addition, citizens have the right to bring litigation against persons or groups of people who can be shown to be causing some harm to the claimant. Through hearing the claims of citizens in civil court,

and the claims of government representatives in criminal court, the judicial branch of government also plays a significant role in the regulation of activities that impact water quality.

The Clean Water Act Section 303(d) calls for the identification of impaired waters. It also requires that the streams be ranked by the severity of the impairment and a Total Maximum Daily Load be calculated that would bring the stream back into compliance with the set water quality standard. Currently, TMDL implementation plans are not required in the Federal Code however; Virginia State Code does incorporate the development of implementation plans for impaired streams. The non-point source part of the Clean Water Act was largely ignored by USEPA until citizens began to realize that regulating only point sources without addressing non-point sources would not result in achievement of water quality standards. Beyond the initiation of the CWA, the entire TMDL program has been complaint driven. Lawsuits from citizens and environmental groups citing USEPA was not carrying out the statutes of the CWA began as far back as the 1970's and have continued until the present. In the state of Virginia in 1998, the American Canoe Association and the American Littoral Society filed a complaint against EPA for failure to comply with provisions of §303(d). The suit was settled by Consent Decree, which contained a TMDL development schedule through 2010. It is becoming more common for concerned citizens and environmental groups to turn to the courts for the enforcement of water quality issues.

In 1989, concerned residents of Castile, Wyoming County New York filed suit against Southview Farm. Southview had around 1,400 head of milking cows and 2,000 total head of cattle. Tests on citizen's wells found them contaminated with nitrates traced to irresponsible handling of animal wastes by Southview. In 1990, Southview was given a notice of violations under the Clean Water Act. Rather than change their farming practices or address the contaminated wells they ignored the warning. In 1995, after court hearings and an appeal, the case was finally settled. Southview had to donate $15,000 to the Dairy Farms Sustainability Project at Cornell University, pay $210,000 in attorney fees for the plaintiff, and employ best management practices (Knauf, 2001). Closer to home, on the Eastern Shore of Virginia, a shellfish farmer sued his neighbor, a tomato grower. The shellfish farmer claimed the agricultural runoff created from the plasticulture operation was carrying pollutants that were destroying his shellfish beds. The suit was settled out of court in favor of the shellfish farm for an undisclosed amount. On September 7, 2005 the U.S. District Court in Lynchburg, Virginia sentenced the operator of the Hardy Road Trailer Park to 27 months in prison and a fine of $270,000 for discharging pollutants into United States waters without a permit (Clean Water Report, 2005).

Successful implementation depends on stakeholders taking responsibility for their role in the process. The primary role, of course, falls on the landowner. However, local, state and federal agencies also have a stake in seeing that Virginia's waters are clean and provide a healthy environment for its citizens. An important first step in correcting the existing water quality problem is recognizing that there is a problem. While it is unreasonable to expect that the natural environment (e.g. streams and rivers) can be made 100% free of risk to human health, it is possible and desirable to make what improvements we can. Virginia's approach to correcting NPS pollution problems has

been and continues to be encouragement of participation through education and financial incentives.

List of Acronyms

BMP	Best Management Practice
BRSWCD	Blue Ridge Soil & Water Conservation District
CLU	Common Land Unit
CREP	Conservation Reserve Enhancement Program
CWA	Clean Water Act
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentive Program
FC	Fecal Coliform
FTE	Full Time Equivalent
IP	Implementation Plan
NPS	Nonpoint Source Pollution
NRCS	Natural Resources Conservation Service
RB-1	Septic tank pump out
RB-2	Septic connection to public sewer system
RB-3	Septic system repair
RB-4	Septic system installation/replacement
RB-5	Alternative waste treatment system
SL-6	Grazing Land Protection System
SMLA	Smith Mountain Lake Association
TMDL	Total Maximum Daily Load
VADCR	Virginia Department of Conservation and Recreation
VADEQ	Virginia Department of Environmental Quality
VCE	Virginia Cooperative Extension
VDACS	Virginia Department of Agriculture and Consumer Services
VDH	Virginia Department of Health
WP-2T	Stream Protection System
WQMIRA	Water Quality Monitoring, Information and Restoration Act

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Addendum A:
Proposed Extension to Lower Blackwater River Implementation Project Area

During the development of the Lower Blackwater River, Maggodee Creek and Gills Creek TMDL Implementation Plan (IP), it was brought to DCR's attention that a portion of the area that local citizens consider the "Lower Blackwater River" is not included in the area covered in the plan. Local citizens, including a county supervisor who was actively involved in the IP process, expressed concern that the community would question the legitimacy of an implementation project and its water quality benefits to Smith Mountain Lake when the entire Blackwater arm into the lake is not included in the IP. The plan addresses the watershed area defined by a point approximately 4 miles downstream of the Route 834 Bridge and is the lower limit of the impairment as defined by DEQ. The proposed extension would include the remainder of the Blackwater River arm of Smith Mountain Lake to its confluence with the Gills Creek arm (Figure 1). The Gills Creek arm is included in the IP.

The extension would result in the entire Blackwater River watershed being covered by a TMDL implementation project. This area corresponds to the remaining portion of the Virginia Hydrologic Unit L10 that is not included in the project area. The proposed area of extension is 29,902 acres. The majority of the area is in Franklin County with a small part of the watershed in Pittsylvania County. According to the 2000 census, approximately 1,340 households are located in this area.

Residential and agricultural implementation needs were estimated using methods employed in the implementation plan development. Based on these methods, 6 straight pipes and 6 failing septic systems within 300 feet of the stream are anticipated (Table 1). The total estimated need for livestock exclusion fencing on perennial streams is approximately 5.2 miles. This takes into account about 2.7 miles of existing exclusion fencing on perennial streams in the area. Through discussions with the Blue Ridge SWCD, 3 loafing lot management systems are anticipated for 3 of the 4 existing dairies in the area. District staff indicated that the livestock in the region include approximately 400 dairy cows, 400-500 beef cattle along with small populations of horses and goats. The technical assistance estimated in the implementation plan is considered adequate to handle the additional work included in this extension. The total estimated cost of BMPs for the proposed extension is $370,771.

The TMDL staff is proposing that this additional area be added to the implementation project as part of the Lower Blackwater impairment. The District would be informed that the allocation of cost-share to landowners in the extended project area should not take priority over cost-share allocations to landowners in the Lower Blackwater River watershed as defined by the TMDL.

Figure1: Proposed area of project extension

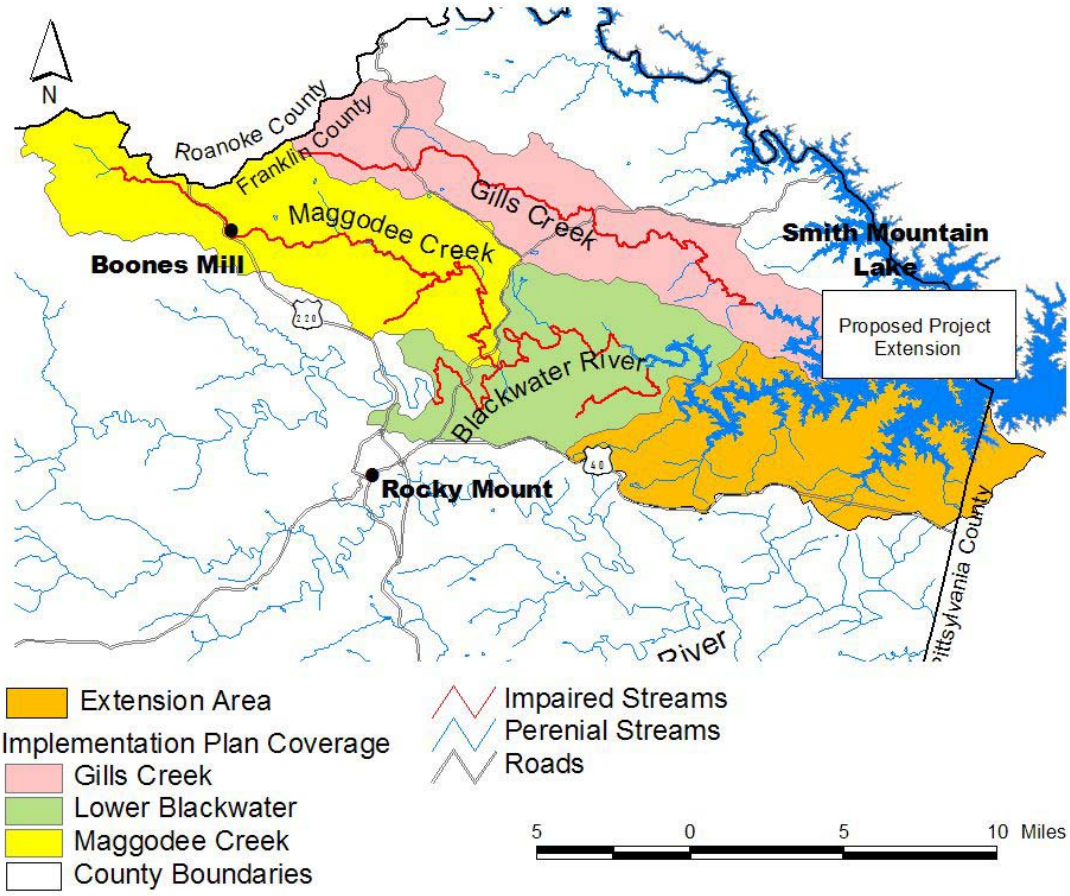

Table 1: Estimated implementation needs and associated costs for the proposed extension.

Control Measure	Unit	Estimated Units Needed	Average Cost / Unit ($)	Total Cost ($)
Agricultural Program:				
Full Exclusion System (SL-6)	system	11	$16,700	$183,700
Stream Protection Practice (WP-2T)	system	3	$7,857	$23,571
Loafing Lot Management System (WP-4B)	system	3	$27,500	$82,500
Exclusion fence replacement	feet	2,000	$3.00	$6,000
Residential Program:				
Conventional Septic System installation/replacement (RB-4)	system	11	$5,000	$55,000
Alternative Waste Treatment System (RB-5)	system	1	$20,000	$20,000
Total Cost				**$370,771**

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